

Guidelines

Periodic Monitoring

September 9, 1999

DRAFT (Rev. 1)

III-87

What is Periodic Monitoring?

Monitoring is a broad term that describes a source's ongoing activities to determine how it is operating in relation to its emission limitations and standards. Monitoring includes activities such as:

- Continuous Emission Monitoring Systems (CEMS)
- Continuous Opacity Monitoring Systems (COMS)
- Parametric Emissions Monitoring (PEMS)
- Parametric Monitoring (continuous or at specified intervals)
- Periodic Source Testing
- Recordkeeping

Periodic Monitoring, a term used in Part 70, describes the combination of monitoring required by the applicable requirements and monitoring created in the title V permit as necessary to meet the CAA requirement that the permit assure compliance with the applicable requirements.

Periodic monitoring is required by the CAA and part 70 because some applicable requirements do not contain adequate provisions for determining whether a source is in compliance with its emissions limitations. For example,

- An applicable requirement may specify that a source must operate an incinerator at a certain temperature, but does not include temperature monitoring and recordkeeping. Periodic monitoring would be added to the title V permit so that the source could assure it is complying with this requirement.
- Many NSPS only require that sources conduct an initial source test to determine whether they are capable of meeting the applicable requirement, but do not require additional monitoring. Periodic monitoring would be added to the title V permit so that the source could show compliance on a continuing basis.

In addition to the requirement for enhanced monitoring, CAA Section 504 requires that permits contain "conditions as are necessary to assure compliance." This CAA requirement is reflected in §70.6(a)(3), which requires "monitoring sufficient to yield reliable data from the relevant time period that are representative of the source's compliance" and §70.6(c)(1), which requires all part 70 permits to contain "testing, monitoring, reporting, and recordkeeping requirements sufficient to assure compliance with the terms and conditions of the permit."

Why Review Periodic Monitoring?

Significant benefits of title V include compliance assurance and public access to data. Periodic monitoring provides data sources can use to promptly identify and correct compliance problems and to certify compliance; the data is also reported to the permitting authority and available to the public. Periodic monitoring provides information and compliance tools to the public that may not otherwise always be available under state law.

EPA has not mandated specific monitoring or protocols for developing monitoring to meet the above requirements. Periodic monitoring determinations are therefore made on a case-by-case basis. Because of the case-by-case nature of periodic monitoring determinations, it is important that permits be reviewed to make sure that periodic monitoring is included and that the determinations are made consistent with part 70 requirements.

Tips for Permit Review

Review each applicable requirement emission limit or standard and determine what monitoring, recordkeeping and reporting (MRR) is associated with the emission limit. Note that periodic monitoring is only required if there is an applicable emission limit or standard. Periodic monitoring is not generally required for State-only requirements (see Applicable Requirements section for more information on State-only requirements.)

The term *emission limit* includes mass, rate and concentration limits, technology requirements, percent reduction requirements, work practice standards, process or control device parameters, and design, operational, or maintenance requirements. See the definition of “emission limitation or standard” in §64.1 for a more detailed definition.

Guidelines: Periodic Monitoring

If there is MRR associated with the emission limit,

- Determine whether the monitoring yields reliable data from the relevant time period that are representative of the source's compliance, and will assure compliance with the emissions limit.

Types of Monitoring Presumed to be Adequate	Types of Monitoring NOT Presumed to be Adequate
<ul style="list-style-type: none">• Continuous compliance determination methods such as CEMS, COMS, and in some cases, recordkeeping.• Monitoring in NSPS and NESHAP standards proposed after 1990• Acid Rain monitoring requirements• CAM monitoring	<ul style="list-style-type: none">• Monitoring in pre-'90 NSPS and NESHAP standards• Monitoring in SIP rules• Monitoring in construction permits, including PSD and NSR permits

These presumptions are explained in the September 15, 1999 memorandum from Eric Schaeffer and John Seitz entitled "Periodic Monitoring Guidance for Title V Operating Permits Programs." In addition, for California, the June 24, 1999 "CAPCOA/CARB/EPA Region IX Periodic Monitoring Recommendations for Generally Applicable Requirements in SIP" (see Appendix E) were developed for specific source categories and emission limits.

- If the MRR is not presumptively acceptable, it may still be acceptable. Review the monitoring and the permitting authority's explanation of monitoring in the Statement of Basis to evaluate whether it assures compliance. Consider:
 - Will the monitoring method yield reliable data with respect to the emission limit?
 - Will the monitoring method provide data that can be related to the relevant time period over which compliance with the emission limit is determined?
 - Will the monitoring data be collected at a frequency that will provide information that is representative of the source's compliance with the permit?
 - Is the monitoring condition written in a way that is practically enforceable? To be practically enforceable, the monitoring must include recordkeeping requirements, and be written in an unambiguous way (see Practical Enforceability Guidelines).

EPA has not mandated specific monitoring or protocols for developing monitoring to meet the above requirements. Periodic monitoring determinations are therefore made on a case-by-case basis. To help make this evaluation and to provide for consistency, it is helpful to consider the following factors. A more detailed discussion of this evaluation is contained in the September 15, 1998 memorandum "Periodic Monitoring Guidance for Title V Operating Permits Programs," which is included in Appendix E. The draft Periodic Monitoring Technical Reference Document also provides a process for developing monitoring and examples of adequate periodic monitoring. The draft can be viewed at <http://www.epa.gov/ttn/emc/cam.html>.

Guidelines: Periodic Monitoring

Factors Helpful to Consider in Evaluating Periodic Monitoring

Factor	Considerations
The likelihood of violating the applicable requirement (i.e., margin of compliance with the applicable requirement);	Consider how close a unit's emissions are to the emission limits during normal and likely upset operations.
Whether add-on controls are necessary for the unit to meet the emission limit;	If controls are required, consider whether the controls will assure compliance with the emission limit. If so, the best option may be to monitor the control equipment for proper operation instead of or in addition to the process.
The variability of emissions from the unit over time;	Consider how emissions may vary: <ul style="list-style-type: none"> Emissions may vary day to day under normal operation e.g. as a turbine or engine increases or decreases load emissions change. Emissions may vary slowly over time e.g. SCR catalyst may degrade over time. Emissions may vary quickly due to malfunction, e.g. a baghouse bag may break.
The type of monitoring, process, maintenance, or control equipment data already available for the emission unit;	Sources often conduct monitoring and/or maintenance of emission units even if not required under an applicable requirement. Consider whether these activities would assure compliance; if so, they may be the best fit/lowest cost monitoring option for that source.
The technical and economic considerations associated with the range of possible monitoring methods; and	When developing monitoring options, consider what is technically feasible for the emission unit in question. Cost information will help in selection between two or more monitoring options that assure compliance.
The kind of monitoring found on similar emission units	When evaluating whether an example could be applied in another case, it is important to compare the emission limit in the example to the emission limit in the case in question, to determine if the monitoring would be assuring of compliance in the new case. Sources for this information: <ul style="list-style-type: none"> Existing title V and construction permits Federal, State and Local rules CAM Guidelines Document California monitoring recommendations Monitoring guidance developed by States

Guidelines: Periodic Monitoring

If there is no monitoring included in the permit for a particular emission limit, or the monitoring appears to be inadequate,

- Check the Statement of Basis and review the permitting authority's documentation of their periodic monitoring evaluation. The Statement of Basis may show that the source is able to assure compliance with the emission limit without monitoring:
 - An engineering evaluation that shows that the source would not exceed the emission limit under its anticipated range of operations. If this demonstration is made, any assumptions included in the demonstration (for example, type of fuel that will be combusted) must be enforceable permit terms.
- If the monitoring is not adequate to assure compliance, monitoring must be added to the permit. Based on available information, make recommendations to the permitting authority on what monitoring would meet the CAA and part 70 requirements. Because periodic monitoring is a case-by-case determination, you will need to work with the permitting authority to develop the monitoring. See Level I for recommendations on resolving issues during the 45-day review period. Where an issue results in an objection, EPA is required to specify in the objection letter how the permitting authority can resolve the objection issue. In the case of periodic monitoring, there are often various monitoring options that would satisfy the periodic monitoring requirement. This can be addressed in an objection letter by specifying monitoring requirements, or a means of developing monitoring requirements, but acknowledging that other monitoring may be acceptable.

Case Study -- Periodic Monitoring Development

Permitting authorities may opt to create a policy or other guidance document explaining treatment of periodic monitoring for "like" applicable requirements associated with "like" emission units. Region 9 has worked with CARB and California Districts to develop periodic monitoring recommendations for specific emission limits and sources categories. This group developed criteria and a process for developing and evaluating monitoring options. Case-by-case monitoring for specific emission limit/emission unit combinations could be developed following this same process.

The Region 9/California group first developed criteria for evaluating monitoring. These criteria are similar to those listed above, but are more specific to local concerns and considerations:

Guidelines: Periodic Monitoring

Periodic Monitoring Criteria

Criterion	Definition
<u>Compliance Assurance</u>	<p>Monitoring that assures compliance is designed to:</p> <ul style="list-style-type: none"> • Monitor key parameters which determine compliance • Be done at a frequency consistent with the likely variability of emissions and margin of compliance • Detect deviations within specific time limits (provide information to operator to correct problems promptly) • Provide information that public could use for direct enforcement.
<u>Margin of Compliance:</u>	<p>Amount of monitoring varies based on how unit is operating with respect to emission limits (x% of emission limit); less monitoring if there is a comfortable margin of compliance.</p> <ul style="list-style-type: none"> • In determining margin of compliance, consider accuracy of emission estimation method -- less monitoring if reliable emission factors exist. Consider <ul style="list-style-type: none"> • Reference method accuracy range e.g. 10% error, and below 90% of limit • AP-42 or other emission factor accuracy e.g. rating and range of emission factor • Consider existence of control equipment
<u>Variability:</u>	<ul style="list-style-type: none"> • Look at emissions over time under normal/upset conditions (within an individual unit) <ul style="list-style-type: none"> • More variability more monitoring; less variability less monitoring • Variability within margin of compliance is acceptable • Also consider variability <ul style="list-style-type: none"> • Within a source category • Caused by equipment failure or degradation, e.g. less ongoing MRR for units without external control devices
<u>Source Size:</u>	<p>Vary monitoring based on unit size as a lb/day or ton/year threshold based on potential uncontrolled emissions, e.g. more monitoring if uncontrolled emissions exceed major source threshold.</p>

Guidelines: Periodic Monitoring

Periodic Monitoring Criteria

Criterion	Definition
<u>Burden/Cost to Permittee</u>	<ul style="list-style-type: none">• Cost of equipment, personnel (training, time spend on job, etc) administrative costs (e.g. time and expense of MRR), cost/ton• Consider the least cost monitoring method that meets other criteria; means of reducing burden/cost include<ul style="list-style-type: none">• Don't require substantial deviations from current unit operations• Allow data from representative units to be used up-front to determine appropriate monitoring and on an ongoing basis to reduce monitoring costs
<u>Reasonableness (Does it make sense?)</u>	<p>Examples:</p> <ul style="list-style-type: none">• Burden on agency i.e. inspections, record review:<ul style="list-style-type: none">Time to<ul style="list-style-type: none">• Implement condition• Review condition• Review data generated by condition• Technical feasibility of monitoring and test methods e.g. stack testing of fugitive emissions• Existing burden for monitoring
<u>Consistency:</u>	<p>Consistency means monitoring may be different but consistently meets the established criteria. Consistency is important between similar or identical sources e.g. with regard to size, source emission unit category, and emission limits.</p>

The Region 9/California group applied the criteria in order to develop monitoring recommendations for several emission limit/source category combinations. These recommendations are found in Appendix E.

The Region 9/California group also developed a process for applying the criteria. The following process is based on an “DRAFT Process for Establishing Appropriate MRR for Title V Permitting” developed by the Region 9/California workgroup and included in Appendix E. The evaluation focuses on developing monitoring for source categories of like emission limits associated with like emission units, however, this process could easily be adapted to develop monitoring for specific emission limits/emission units on a case-by-case basis.

Example Steps In Monitoring Evaluation

Step	Description	Example
Define Source Categories and Subcategories	In the first phase, the group attempts to clearly define the source category or subcategory to be investigated. If a category contains different emitting processes, the category should be broken up into subcategories.	<p><i>For particulate emissions from material handling operations, for example, five subcategories were initially identified as different emitting processes. These were:</i></p> <ul style="list-style-type: none"> <i>a. Baghouses</i> <i>b. Vent filters</i> <i>c. Fugitive Emissions</i> <i>d. Cyclones</i> <i>e. Scrubbers</i> <p>Other differences that may ultimately warrant different MRR strategies may also be used to separate source categories into rational subcategories. Vent filters, for example, were further divided into two subcategories based on whether their operation was continuous or intermittent.</p>
Preliminary Investigation	The next step toward establishing appropriate monitoring is for members of the group to discuss their understanding of the emissions processes and applicable requirements. The group may identify the need for additional information about the emitting processes or applicable requirements at this point.	

Example Steps In Monitoring Evaluation

Step	Description	Example
Identify Example Sources	<p>It is also helpful to perform analyses in the context of real world examples. District permit files contain information on thousands of actual source operations that may be used as examples.</p> <p>The group should attempt to reach consensus that the examples are indeed representative. If the group cannot agree that the examples are representative, additional alternative examples should be identified.</p>	<p><i>For particulate emissions Material Handling emissions from baghouses, the group focused on one large mineral processing operation in the South Coast AQMD.</i></p> <p>The following information is generally useful for each example:</p> <ul style="list-style-type: none"> a. Facility Name b. Facility Type c. Description of Emitting Operation including information regarding equipment type, equipment size, ratings, fuels, materials, control equipment, etc.. d. Description of the Existing Monitoring e. Compliance Data from source tests, engineering evaluations, etc. f. Emissions data g. Emission Limit h. Margin of Compliance
Identifying Causes of Variation	<p>Whenever possible, the group should identify any causes of excessive variability or noncompliance. Experienced District Staff, CARB Staff, EPA staff, and source operators may be able to help identify causes of variation.</p>	<p><i>For particulate emissions Material Handling emissions from baghouses, for example, failure of filter bags due to holes, tears, etc. was identified as the primary cause of noncompliance with opacity requirements and generic emission limits. This led the group toward considering parametric monitoring schemes that would identify bag leaks.</i></p> <p>Again, it is important that the group achieve consensus on the validity of these determinations.</p>

Example Steps In Monitoring Evaluation

Step	Description	Example
Data Collection	Although looking at one specific example is useful when analyzing monitoring needs, one example generally will not provide enough information regarding variability. This information may be obtained by reviewing source test data, reviewing compliance records, and by talking to experienced compliance or operations people.	<p><i>One way to obtain additional information about emission units is to review standard reference materials. Another is to talk to experienced District Staff, CARB Staff, EPA staff, and source operators.</i></p> <p>By reaching a common understanding of the emitting processes and applicable requirements early, the group can avoid conflicts later.</p> <p>This information may be obtained by reviewing source test data, reviewing compliance records, and by talking to experienced compliance or operations people.</p>
Brainstorm Possible MRR Types	Next, the group should brainstorm potential monitoring proposals. Ideas for monitoring proposals may come from experience, be developed by applying technologies used for similar source categories, or they may be innovative.	<i>For particulate emissions Material Handling emissions from baghouses, emissions calculation, one- time sources test, several parametric monitoring schemes, annual source testing triboelectric monitoring, and continuous opacity monitors were identified as potential candidates.</i>

Example Steps In Monitoring Evaluation

Step	Description	Example
Develop an Options Table for Each Example	<p>The options table should contain one row for each potential monitoring option and the following five columns:</p> <p>a) Monitoring Type – Briefly describe each monitoring option (e.g. one-time sources test, monthly opacity test by EPA method 9, etc.)</p> <p>b) Cost – The estimated annual cost (or one-time cost) of performing the monitoring. Monitoring costs have been obtained from vendors, estimation programs, literature, and knowledgeable staff.</p> <p>c) Reasonableness – For each monitoring option, the technical feasibility and burden to the permitting agency should be addressed under this heading.</p> <p>d) Consistency – The consistency with existing regulations and permitting practices in California and in other regions is evaluated here.</p> <p>e) Compliance – This section is used to address compliance assurance, margin of compliance and variability. One key question to be answered here is: “To what extent will the proposed monitoring method provide data for evaluating compliance on an ongoing basis?” Other relevant information may also be included.</p>	<i>An example options table from the Material Handling Group is included in Appendix E.</i>
Review Options Table	The group should review the options table and openly discuss the relative merits of each option.	

Example Steps In Monitoring Evaluation

Step	Description	Example
Choose MRR Method and Frequency	Choose the most appropriate monitoring method and frequency from the options table. Some of the criteria, such as technical feasibility and data necessary to determine compliance on an ongoing basis, are go/no go criteria. The group cannot choose a monitoring method that is not technologically feasible, or that will not provide necessary data. For other criteria such as cost and consistency, there is not a go/no go threshold. The group must consider the relative merits of each option with respect the criteria. If consensus cannot be reached based on the existing information in the options table, more data/information may be collected.	
Evaluate the Scope to the Determination	The group must decide the scope of the determination (how it extends to other sources in the category). This may be accomplished by placing size or throughput limits on the determination, and identifying any exceptions where the determination may not apply and a different monitoring method or frequency is appropriate.	

The Following Information Appears in Appendix E:

- National Periodic Monitoring Memo
- CAM Questions and Answers
- CAPCOA/CARB/EPA Region IX Periodic Monitoring Recommendations for Generally Applicable Requirements in SIP
- CAPCOA/CARB/EPA Periodic Monitoring Process and Criteria

Other Information:

- See <http://www.epa.gov/ttn/emc/cam.html> for
 - Draft Periodic Monitoring Technical Reference Document
 - Draft CAM Guidance Document